

Historically, studying the Martian ionosphere has been difficult due to the lack of dedicated instruments for electron density measurements in the orbit of Mars. However, since 2005, radio occultation measurements have been supplemented by Mars Express MARSIS remote sounder data and, more recently, by data from the MAVEN LPW Langmuir probe since 2014. The ionosphere of Mars is an interesting system, because Mars as one of the two solar system planetary bodies without an intrinsic magnetic field has highly localised crustal magnetic fields. The Chapman model describes the main layer of the ionosphere surprisingly well. Nevertheless, the crustal magnetic fields and other parameters potentially influence the ionosphere formation and topology. Combining the recent vast electron density data set, the Mars Global Surveyor crustal magnetic field map, and F10.7 solar radio flux measurements carried out at the Earth, a detailed study of the influence of these parameters can be conducted. To study the influence of these parameters as well as solar zenith angle on electron densities in the Martian ionosphere, we study magnitude of deviations from the established Chapman model. Furthermore, we use the Kolmogorov's $5/3$ power law to investigate a possible dependence of its parameters characterising power and dissipation of the fluctuations on relevant parameters.